

BIOLOGY AS AND A2 FIELDWORK EXERCISES: SUMMARIES

Freshwater Ecology

This study investigates the distribution of invertebrates within an upland stream. Invertebrates are sampled in both pools and riffles using the area disturbance method. Abiotic variables, including dissolved oxygen content, are recorded.

The habitat preferences of invertebrates are related to environmental factors. Students explore the respiratory, anatomical and behavioural adaptations of the invertebrates to explain why different species favour different areas of the stream.

Follow up work may include calculation of species richness and species diversity and statistical analysis of the data set. This work may also be related to ecological energetics – food webs, pyramids of numbers and biomass.

Freshwater Pollution

The River Ebbw Fawr has a long history of organic (sewage) and inorganic (particularly from steel industry) pollution. During this day we compare a control site, a site close to the town and former steelworks and a recovery site several miles downstream. Invertebrates are collected using kick sampling and used as indicators of the level of pollution. The respiratory, anatomical and behavioural adaptations of invertebrates able to survive in the most polluted part of the river are discussed. Water samples are also tested using chemical methods. A visual assessment of the area and water quality is also carried out at each site.

Follow up work includes collation of data, calculating the BMWP score for each site to determine the level of pollution, and calculating the species richness and diversity score for each site.

Sand Dune Succession

This study is used to provide students with an example of the process of primary succession, and of xerophytic adaptations of plants on the embryo and fore dunes. The dunes are surveyed using systematic sampling by means of a belt transect and frame quadrat. Each plant encountered is identified and the percentage frequency is recorded. Quadrat sampling is accompanied by sampling of abiotic variables, including soil moisture content, soil pH and windspeed. The gradient of the dune is also measured.

Follow up work may include soil analysis, calculation of richness and diversity scores, construction of kite diagrams and dune profile graphs, and statistical analysis using Spearman's Rank correlation coefficient.

This study may be coupled with a talk from one of the Nature Reserve wardens to discuss management and conservation issues associated with the sand dunes.

Moorland Ecology

This study looks at the distribution of plants on an environmental gradient from the (relatively) dry moorland down an incline to the wet mire. It provides a clear example of how edaphic factors influence plant distribution and also of xerophytic and hydrophytic adaptations. The area is surveyed using systematic sampling by means of a belt transect and frame quadrat. Each plant encountered is identified and the percentage cover is recorded. Quadrat sampling is accompanied by sampling of abiotic variables.

Follow up work may include soil analysis, calculation of richness and diversity scores, construction of kite diagrams and dune profile graphs, and statistical analysis using Spearman's Rank correlation coefficient.

Succession on Colliery Spoil

The Pwll Du area of colliery spoil provides an alternative example of succession, this time on a lithosere. Three areas of spoil (ca. 1850, 1950, 1980) are surveyed using a frame quadrat and random sampling methods. The percentage frequency of each plant is recorded, backed up by abiotic data. The spoil may be compared to a control site of nearby open moorland, which introduces students to the concept of a plagioclimax community.

Follow up work may include soil analysis, richness and diversity scores and statistical analysis.

Woodland Ecology

Coed-y-person, Abergavenny, is an ancient mixed woodland which is managed by the Countryside Council for Wales (CCW). The wood is divided into areas which have undergone different management practices (unrestricted grazing; no grazing for at least 200 years; grazing stopped only 15 years ago). A further site (a coniferous plantation) may be surveyed in contrast to the deciduous woodland if required.

For smaller groups Gadr farm may be used as an alternative. This area of woodland is being managed by coppicing as part of an agri-environment scheme. Plots at different stages in the coppicing cycle may be sampled to determine the impact of management on the diversity of this woodland.

In both cases, the area is surveyed using frame quadrats and random sampling. The percentage frequency of plants in the ground and field layers of the woodland are recorded, along with the number of saplings. Abiotic measurements are used to support this data, particularly light intensity.

Forestry

Visits to Forestry Commission plantations may be organised to cover such issues as sustainability in forestry, productivity and factors affecting timber yields, and biodiversity in plantation woodlands. This may be coupled with a visit to managed deciduous woodland for comparison.

Farming Issues

A farm tour and talk at a local organic farm allows students to gain experience of farming practice. Topics to be discussed include the conflict between productivity and conservation, methods used to drive up productivity on a conventional farm and the reasons the farmer has chosen to go organic. Students are also encouraged to consider the benefits of maintaining high biodiversity on the farm, particularly the role this plays in pest control. Please note – there may be an additional charge to cover the farmers' time.

Rocky Shore

This study aims to investigate patterns of marine zonation of organisms on a rocky shore. Species distribution, abundance and diversity are related to biotic and abiotic factors and adaptations are discussed.

Follow up work may include plotting beach profile graphs, kite diagrams and statistical analysis where appropriate.

Please note this study is tide dependent.

Population Ecology

This short study introduces the method for estimating population size of mobile species through the mark- release - recapture method and the Lincoln index.

Biology fieldtrips at Ty'r Morwydd are designed to provide students with a range of practical and investigative skills, which may be drawn on in the completion of board- set assessed practical work, completed back at school / college. Alternatively many of the studies suggested may be developed into Individual investigations.